

MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

MS7N65F

Product specification

Description

The MS7N65F can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220F, which accords with the RoHS standard.


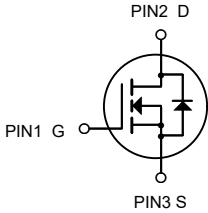

General Features

- $V_{DS}=650V, I_D=7A$
- $R_{DS(ON)} < 1.35\Omega @ V_{GS}=10V$

Application

- Power switch circuit of adaptor and charger

Reference News

PACKAGE OUTLINE	N-Channel MOSFET	Marking
		
TO-220F		MS7N65F

Note : ****Representative production cycle

Absolute Maximum Ratings@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage	650	V
V_{GSS}	Gate-to-Source Voltage	±30	
I_D	Continuous Drain Current	7	A
I_{DM}	Pulsed Drain Current at $V_{GS}=10V$	28	
E_{AS}	Single Pulse Avalanche Energy	245	mJ
P_D	Power Dissipation	34	W
T_L T_{PAK}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	300 260	°C
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 150	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.7	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	54	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Electrical Characteristics($T_J = 25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{V}$, $V_{GS} = 0\text{V}$	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 30\text{V}$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2	3	4	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance ⁽⁴⁾	$V_{GS} = 10\text{V}$, $I_D = 3.5\text{A}$	-	1.15	1.35	Ω
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$	-	1089	-	pF
C_{oss}	Output Capacitance		-	100	-	pF
C_{rss}	Reverse Transfer Capacitance		-	14	-	pF
Q_g	Total Gate Charge	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DS} = 520\text{V}$, $I_D = 7\text{A}$	-	27	-	nC
Q_{gs}	Gate Source Charge		-	6	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	11	-	nC
$t_{d(on)}$	Turn-On DelayTime	$V_{GS} = 10\text{V}$, $V_{DD} = 319\text{V}$ $I_D = 7\text{A}$, $R_{GEN} = 24\Omega$	-	19	-	ns
t_r	Turn-On Rise Time		-	29	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	78	-	ns
t_f	Turn-Off Fall Time		-	35	-	ns
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	7	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	28	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = 7\text{A}$	-	-	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F = 7\text{A}$, $di/dt = 100\text{A/us}$	-	340	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	2.9	-	μC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2. EAS condition: Starting $T_J=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $V_G=10\text{V}$, $R_G=25\text{ohm}$, $L=10\text{mH}$, $I_{AS}=7\text{A}$

3. R θ JA is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB

4. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

Typical Performance Characteristics

Figure 1: Output Characteristics

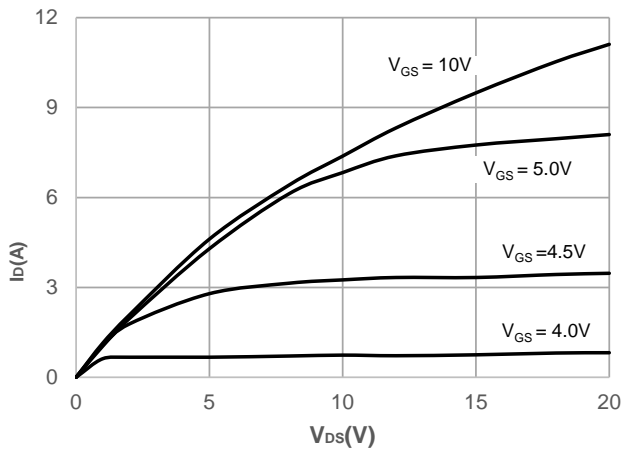


Figure 2: Typical Transfer Characteristics

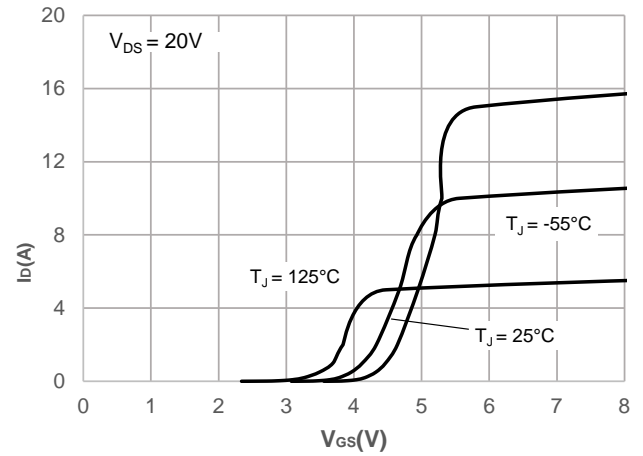


Figure 3: On-resistance vs. Drain Current

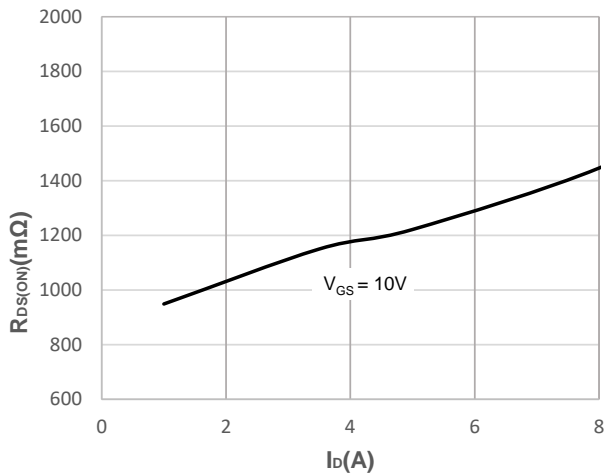


Figure 4: Body Diode Characteristics

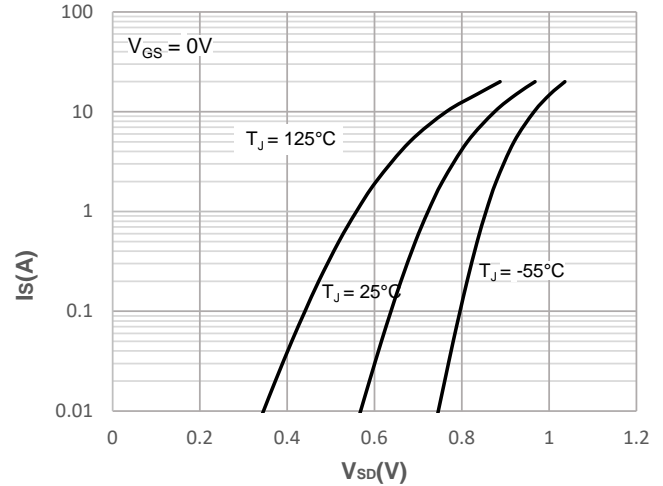


Figure 5: Gate Charge Characteristics

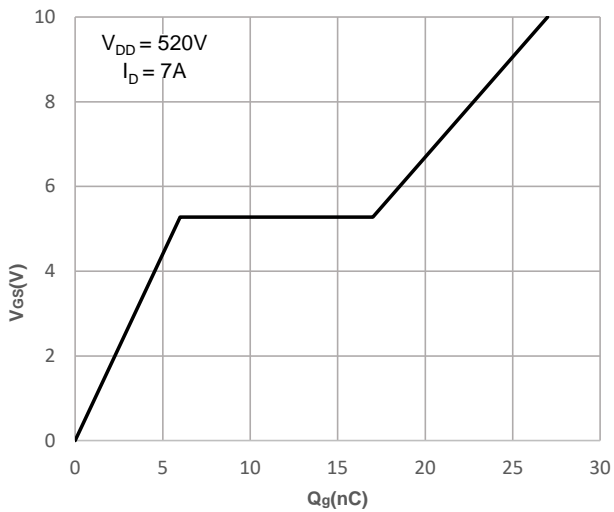
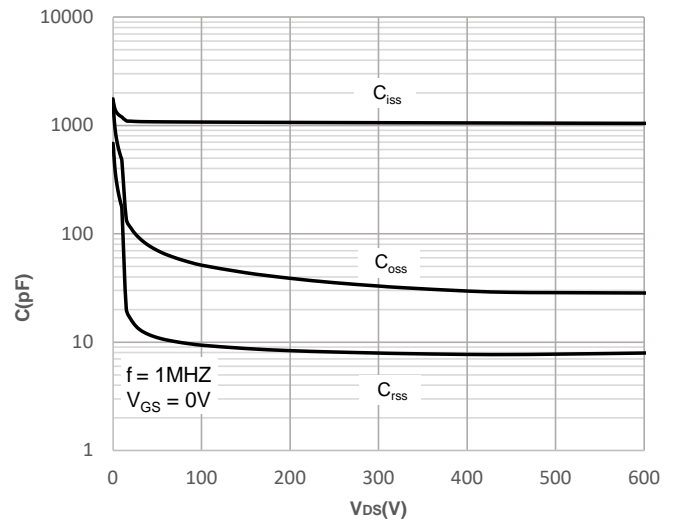


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

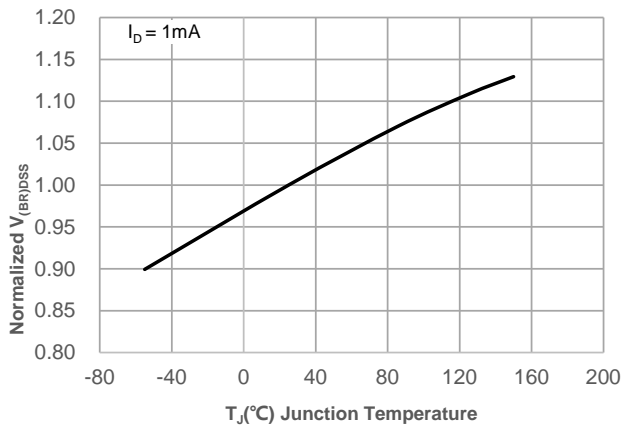


Figure 8: Normalized on Resistance vs. Junction Temperature

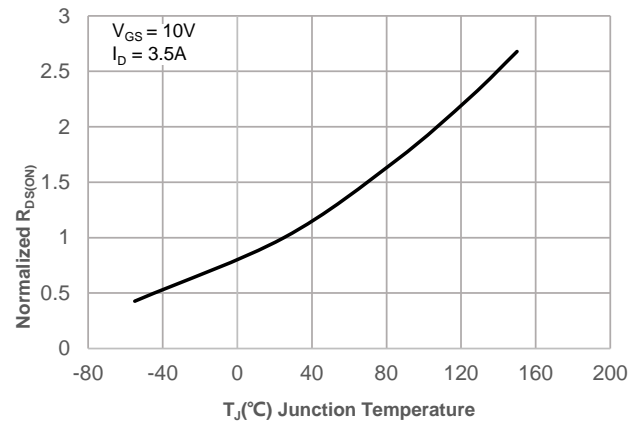


Figure 9: Maximum Safe Operating Area

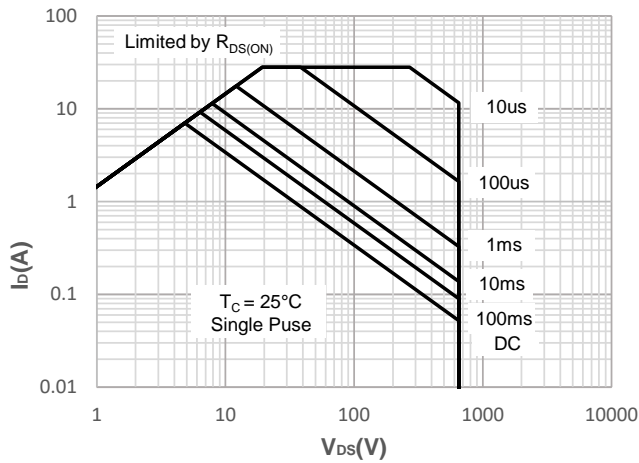


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

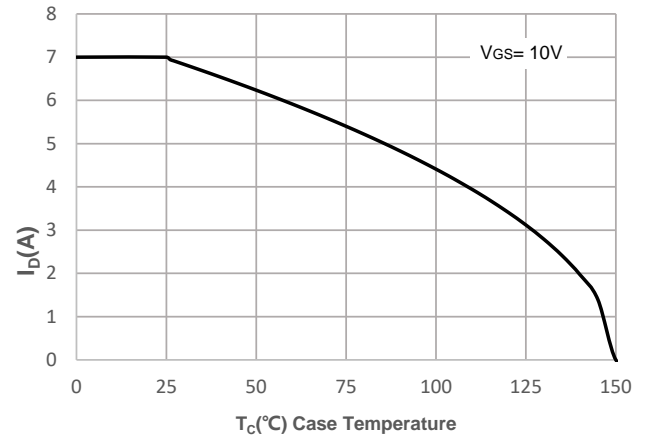


Figure 11: Normalized Maximum Transient Thermal Impedance

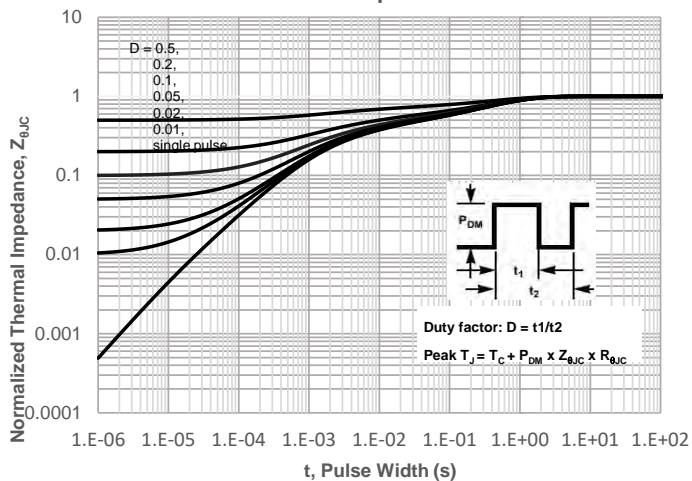
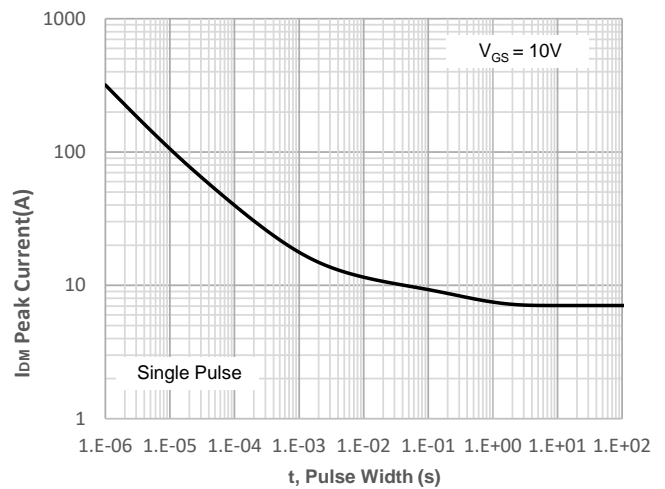


Figure 12: Peak Current Capacity



Test Circuit

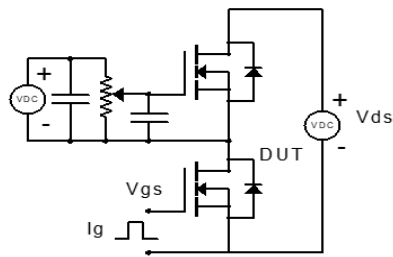


Figure 1: Gate Charge Test Circuit & Waveform

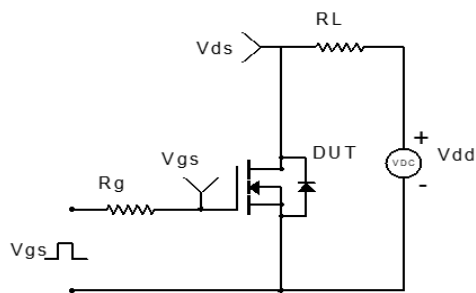


Figure 2: Resistive Switching Test Circuit & Waveform

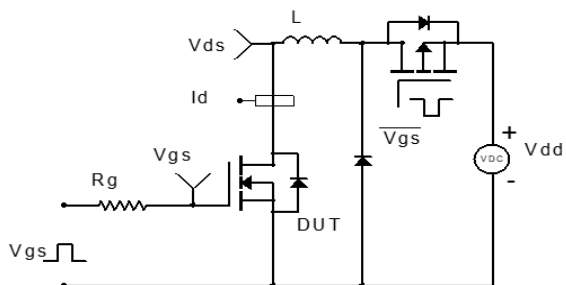


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

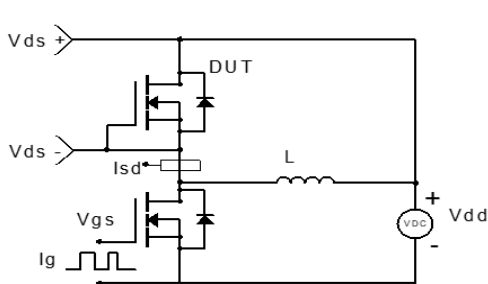
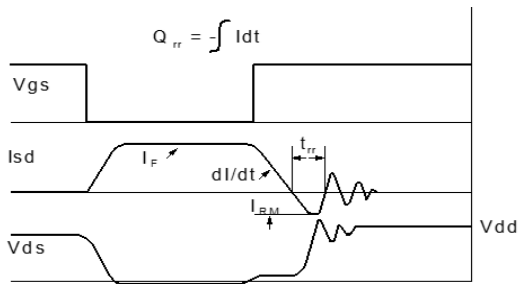
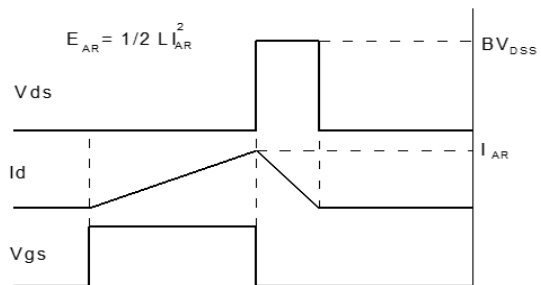
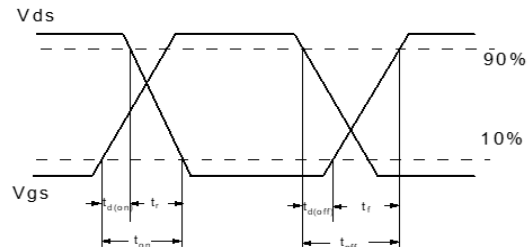
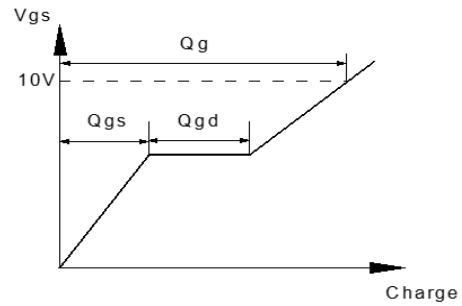
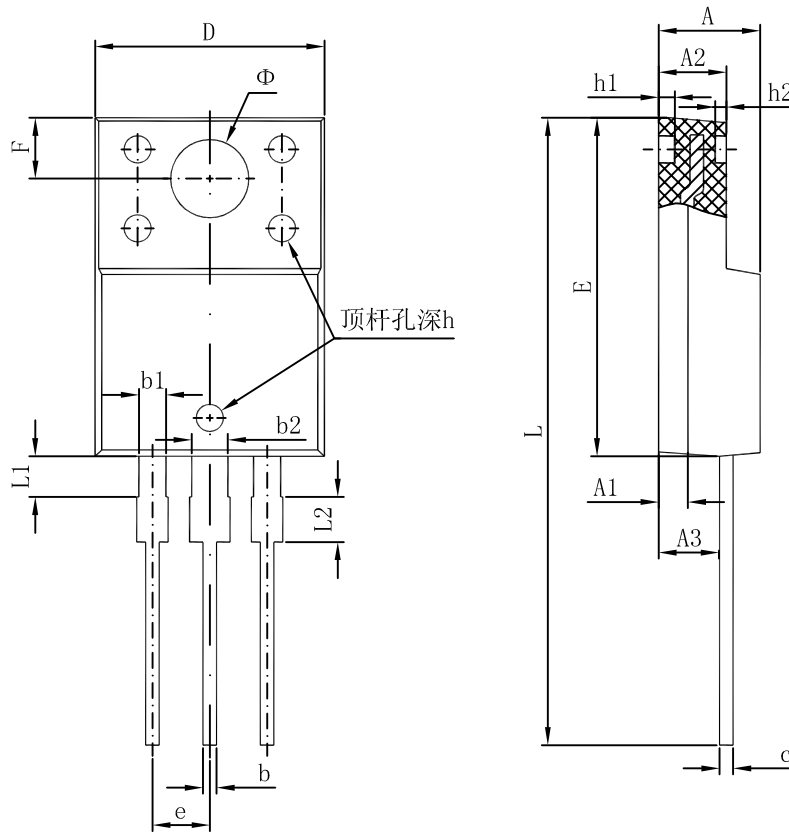


Figure 4: Diode Recovery Test Circuit & Waveform



Package Dimension TO-220F



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
Φ	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083

REEL SPECIFICATION

P/N	PKG	QTY
MS7N65F	TO-220F	1 tube of 50pcs/1 box of 1000pcs

Attention

■ Any and all MSKSEMI Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your MSKSEMI Semiconductor representative nearest you before using any MSKSEMI Semiconductor products described or contained herein in such applications.

■ MSKSEMI Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specification of any and all MSKSEMI Semiconductor products described or contained herein.

■ Specifications of any and all MSKSEMI Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

■ MSKSEMI Semiconductor strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

■ In the event that any or all MSKSEMI Semiconductor products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

■ No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of MSKSEMI Semiconductor.

■ Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. MSKSEMI Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringement of intellectual property rights or other rights of third parties.

■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the MSKSEMI Semiconductor product that you intend to use.